

Description of five new marginellids from bathyal levels of southern New Caledonia

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ABSTRACT : One species of *Gibberula*, three species of *Dentimargo*, and one species of *Protoginella* are described as new from bathyal levels south from New Caledonia. *Dentimargo caledonicus* (Cossignani, 2001) is redescribed and a new type locality is proposed. Some elements are given about the apparent distribution of the six species.

RESUME : Une espèce de *Gibberula*, trois espèces de *Dentimargo* et une espèce de *Protoginella* sont décrites comme nouvelles du bathyal au sud de la Nouvelle-Calédonie. *Dentimargo caledonicus* (Cossignani, 2001) est redécrit, et une nouvelle localité type est proposée. Quelques éléments relatifs à l'apparente distribution des six espèces sont présentés.

INTRODUCTION

In a precedent article (Boyer, 2001), the author presented a first set of ten bathyal marginellids collected south from New Caledonia and conserved in the Malacology department of the Muséum national d'Histoire naturelle. In view of this first article, few stations, as parts of four benthic campaigns, were checked.

A further work on the general marginellids collections from New Caledonia in MNHN led to have a better knowledge of this fauna, especially about some well-marked trends, like a very high diversity at the specific level (around 100 species of marginellids are represented from bathyal levels and apparently as many in infralittoral), numerous complexes of sibling species, and pronounced situations of endemism, even at the bathyal levels.

The diversity of marginellids from New Caledonia is also important at the generic level, the genus *Cystiscus* (Cystiscidae) being dominant in shallow water and the genus *Dentimargo* (Marginellidae) being dominant at the bathyal levels. This pattern is original compared to that one represented in the surrounding southwest pacific archipelagos (Vanuatu, Fiji and Tonga collections in MNHN) where the bathyal marginellids fauna is characterized by a wide diversity into the group *Serrata*. This contrasted situation will require to be interpreted on the ground of further inquiries.

This article is conceived as a complement to our previous paper. It devotes to the description of five new species which are especially well represented at the bathyal levels south from New Caledonia, or

which present close affinities with such ones.

Cossignani (2001) described as new six species of marginellids said to come from Northern New Caledonia. One of these species, named as *Prunum caledonicum*, belongs in fact to an area ranging south from New Caledonia, where it is rather common in upper bathyal. The original description of this species being somewhat summary, a redescription is given hereunder together with full collecting references from MNHN material, and a new type locality is proposed.

The holotypes of these six new species were initially deposited in a private museum from Cupra Maritima, Italy. They were removed from this place by Dr Cossignani in December 2001 and deposited in MNHN.

Abbreviations

L = length; W = width; lv = live collected specimen; dd = dead collected specimen; ad = adult; juv = juvenile; fr = fragment; stn = station; N.C. = New Caledonia.

AMS = Australian Museum, Sydney; MMM = Mostra Mondiale Malacologia, Cupra Maritima; MNHN = Muséum national d' Histoire naturelle, Paris; NMNZ = National Museum of New Zealand; NSMT = National Science Museum, Tokyo.

SYSTEMATICS

Genus *Gibberula* Swainson, 1840

Type species : *Gibberula zonata* Swainson, 1840 (= *Volvaria oryza* Lamareck, 1822), by monotypy.

The genus *Gibberula* is not represented by many species in the bathyal levels of N.C. The species described as new hereunder is the largest sized *Gibberula* found off Southern N.C.

Gibberula nebulosa sp. nov.

Figs 1-3

Type material. Holotype (6.05 x 4.15 mm), MNHN (Fig. 1) : SMIB 8, stn DW 197-199.

Paratypes : 11 ad (L = 5.95 to 7 mm) and 2 juv, MNHN (Figs 2-3), same stn.

Material examined. "Vauban" 1978-1979 : stn 15, 22°49'S, 167°12'E, 390-395 m, 1 lv. – stn 16, 22°46'S, 167°12'E, 390-400 m, 3 dd. – stn 37, 22°32'S, 166°26'E, 175-250 m, 1 dd. – stn 40, 22°30'S, 166°24'E, 250-350 m, 2 dd, 2 juv dd.

BIOCAL : stn DW 37, 23°00'S, 167°16'E, 350 m, 1 dd. – stn 44, 22°47'S, 167°14'E, 440-450 m, 1 dd.

MUSORSTOM 4 : stn DW 210, 22°44'S, 167°09'E, 340-345 m, 1 dd. – stn DW 226, 22°47'S, 167°22'E, 390 m, 1 dd.

SMIB 8 : stns DW 197-199, 22°52'S-22°53'S, 168°12'E-168°13'E, 408-436 m, 1lv (holotype Fig. 1), 2 juv lv (paratypes), 11 dd (paratypes Figs 2-3).

BATHUS 2 : stn DW 729, 22°52'S, 167°12'E, 400 m, 1 lv, 1 juv lv, 5 dd, 1 fr – stn DW 739, 22°35'S, 166°27'E, 465-525 m, 4 dd.

Type locality. SMIB 8, stns DW 197-199, 22°52'S-22°53'S, 168°12'E-168°13'E, 408-436 m, off Ile des Pins, southeast of Grand Récif Sud, N.C., bathyal.

Description. Shell ovate subcylindrical, moderately slender; protoconch small, paucispiral, hyalinous grey, very faintly produced and partially covered by callous enamel of the last whorl of the spire, spire mostly sunken; aperture as long as the entire shell, narrowed, slightly widened towards the base, labrum faintly sinuous, labial denticles faint or lacking, faintly developed lirations within the inner lip, thin but distinct labial margin, making a strong oblique varix at the base of the dorsum; parietal border faintly convex, 3 visible columellar plaits, the two first ones being the strongest, one to several lirations on the parietal wall, well-incised siphonal notch; ground colour whitish, spire whorls brownish, body whorl covered by a lattice pattern of crossing diagonal flammules, making a nebulous appearance.

Distribution. Southern N.C. (22°30'S to 23°00'S; 166°24'E to 167°22'E). Bathyal : lv in 395-436 m, dd in 250-465 m.

Remarks. The morphology and the decoration of the shells are very constant. Their size range is L = 5.4 to 7.1 mm, W = 3.4 to 4.1 mm.

G. nebulosa sp. nov. must be considered as a sibling species of the northern *G. quemeneri* (Cossignani,

2001), which shows stronger lirations but a fainter labial margin and a whitish concave spire, whereas *G. nebulosa* has a brownish faintly convex one. The decoration of *G. quemeneri* presents two extreme phases : a basic pattern of zic-zac axial yellowish lines, which may coexist with several blade-like spiral bands of the same colour. The axial lines may be lacking, a pattern of spiral bands and flammules may ornate the entire shell. However, this last pattern does not show any trend of crossing or merging and appears as structurally different from that one of *G. nebulosa*.

G. nebulosa is not represented in the MNHN collections from Northern N.C., and the two sibling species appear as being non-sympatric at both ends of N.C.

The scarce samplings made off Western N.C. do not allow to verify if both species are succeeding, overlapping or lacking in this area.

Etymology. Referring to the nebulous aspect of the shell decoration.

Genus *Dentimargo* Cossmann, 1899

Type species : *Marginella dentifera* Lamarck, 1803, by original designation.

Dentimargo caledonicus (Cossignani, 2001)

Figs 3-6

Prunum caledonicum - COSSIGNANI, 2001, p. 15.

Holotype 14.33 x 7.00 mm, MNHN. Type locality : Grand Passage, Northern N.C.

Material examined. SUD POINTE GRAND RÉCIF, 1976 : 200 m, 1 dd.

"Vauban" 1978-79 : stn 15, 22°49'S, 167°12'E, 390-395 m, 2 dd. – stn 16, 22°46'S, 167°12'E, 390-400 m, 1 dd.

BIOCAL : stn DW 38, 23°00'S, 167°15'E, 360 m, 1 dd. – stn DW 44, 22°47'S, 167°14'E, 440-450 m, 1 lv, 1 juv lv, 9 dd, 2 juv dd.

MUSORSTOM 4 : stn DW 212, 22°47'S, 167°10'E, 375-380 m, 7 dd, 1 juv dd. – stn DW 222, 22°58'S, 167°33'E, 410-440 m, 1 lv, 4 juv lv, 1 dd. – stn DW 229, 22°51'S, 167°13'E, 445-460 m, 1 dd.

SMIB 1 : stn DW 2, 22°52'S, 167°13'E, 415 m, 2 dd.

SMIB 2 : stn DW 1, 22°53'S, 167°13'E, 438-444 m, 2 dd. – stn DW 3, 22°56'S, 167°15'E, 412-428 m, 2 juv lv, 2 dd. – stn DW 6, 22°56'S, 167°16'E, 442-460 m, 1 dd. – stn DW 14, 22°53'S, 167°13'E, 405-444 m, 1 lv.

SMIB 3 : stn DW 29, 22°47'S, 167°12'E, 405 m, 2 dd.

SMIB 8, stns DW 197-199, 22°52'S-22°53'S, 168°12'E-168°13'E, 408-436 m, 3 lv (Figs 4-6), 1 juv lv, 22 dd, 1 juv dd. – stn DW 200, 23°00'S, 168°21'E, 514-525 m, 1 dd.

BATHUS 2 : stn DW 719, 22°48'S, 167°16'E, 444-445 m, 8 dd, 1 juv dd. – stn DW 729, 22°52'S, 167°12'E, 400 m, 5 dd. – stn DW 730, 23°03'S, 166°58'E, 397-400 m, 1 dd.

Description. Shell subcylindrical, slender; protoconch medium sized, low, moderately wide, paucispiral; spire moderate, regularly conical, non-stepped, made of 3 whorls, representing around 30 % of the total length; aperture widely opened towards the base, labrum straight and vertical, the small upper labial denticle is principally made by the depression of the anal canal, inner labrum smooth or very faintly denticulate, external margin moderately thickened, bordered by a deep groove on the backside, shoulder of the labrum stepped; parietal border oblique and straight, the columellar zone being faintly concave and bearing 4 columellar plaits, the first two ones being oblique and subequal, the third one almost horizontal, and the fourth nearly perpendicular to the parietal border; a pronounced wide varix is generally apparent towards the ventral base of the body whorl, at the level of the columellar plaits; ground colour horny to amber, with one orange spiral band at the top of the body whorl, one orange spiral line a short distance below, another spiral line behind the basal callosity and a lower spiral line are present on the spire whorls, all these bands and lines are discontinuous, only the lines are extending on the labial margin.

Distribution. Southern N.C. (22°46'S to 23°00'S, 167°10'E to 167°33'E). Bathyal : lv in 436-440 m, dd in 200-514 m.

Remarks. The morphology and the decoration of the shells are very constant. Their size range is : L = 12.2 to 16.8 mm, W = 6.2 to 7.6 mm. The species is not represented in the MNHN collections from Northern N.C. and seems to be restricted to the Southern N.C. The replacement of the species within the genus *Dentimargo* is based on the presence of a sharp denticle at the upper part of the inner labrum and of small denticles below.

Dr Cossignani founded this species on two specimens reported from a northern station. This record seems to be erroneous, and the type locality is changed here as "south of N.C., bathyal".

***Dentimargo tropicensis* sp. nov.**

Figs 7-9

Type material

Holotype (13 x 5.7 mm), MNHN (Figs 7-8) : SMIB 8, stn DW 182-184.

Paratypes : 3 ad (L = 11 to 11.6 mm) and 10 juv, MNHN (Fig. 9): same stn.

Material examined. SMIB 8 : stns DW 182-184, 23°18'S, 168°05'E, 305-367 m, 3 lv (holotype Figs 7-8, 2 paratypes Fig. 9), 10 juv lv (paratypes), 1 dd (paratype). – stn DW 189, 23°18'S, 168°06'E, 400-402 m, 2 lv, 2 juv lv. – stn DW 190, 23°18'S, 168°05'E, 305-310 m, 5 juv lv, 1 juv dd.

BATHUS 3 : stn DW 830, 23°20'S, 168°01'E, 361-365 m, 1 dd.

Type locality. SMIB 8, stn DW 182-184, 23°18'S, 168°05'E, 305-367 m, Banc Aztèque, Northern Norfolk ridge.

Description. Shell slender biconical, narrow; protoconch domed, medium sized, paucispiral; spire high and produced, made of 3 $\frac{3}{4}$ whorls faintly convex and representing more than 35 % of the total length; aperture very narrowed, labrum faintly arched, the small upper labial denticle fastens an enclosed anal canal, the produced inner labrum enveloping the aperture, bearing 15 smaller denticles, the lower one making like a button-like varix inside the aperture, beside the siphonal canal ; external margin moderately thickened, bordered by a deep groove on the backside, shoulder of the labrum stepped; parietal border oblique and straight, the columellar zone being faintly concave and bearing 4 columellar plaits, the first two ones being oblique and subequal, the third one almost horizontal, and the fourth nearly perpendicular to the parietal border; ground colour flesh beige, with one orange spiral band at the top of the body whorl, one orange spiral line a short distance below, another spiral line and a basal band at the level of the columellar plaits, the upper spiral band and the lower spiral line being also present on the spire whorls, all these bands and lines are generally discontinuous, the extensions of the lines on the labial margin are present even when the lines are lacking.

Distribution. Northern Norfolk ridge (23°03'S to 23°20'S, 166°58'E to 168°06'E). Bathyal : lv in 310-400 m, dd in 310-397 m.

Remarks. The morphology of the shell is somewhat variable in its restricted range of distribution. The specimens collected on Banc Aztèque (SMIB 8, stns 182-184 and stn 189) are more variable, as well for their outline (from very narrow and slender fusiform to squat biconical) than for their decoration (from uniformly deep greenish yellow or golden amber to milky white with dark orange marks) and other features (as the relative thickness and denticulation of the inner labrum). The size range of the shells is : L = 11 to 13 mm, W = 5 to 5.7 mm.

D. tropicensis sp. nov. shows close similarities with *D. caledonicus*.

It differs from this last species principally on the ground of its much-narrowed aperture, attenuated base, narrow outline and length/width ratio.

It must be underlined that both species are not overlapping, but on the contrary their geographic ranges are following according to a very steep manner : between the specimen of *D. caledonicus* from SMIB 8, stn DW 200 (23°00'S, 168°21'E) and the specimens of *D. tropicensis* from SMIB 8, stn DW 189 (23°18'S, 168°06'E), which are in the closest vicinity, we do not verify any tendency to intergrading. So, it seems that we are in the case of an "insular isolation", *D. tropicensis* having speciated on the submarine relieves ("guyots") situated at the north of the Norfolk ridge, from an ancestral population belonging to the *D. caledonicus* lineage. A very small shell of *D. caledonicus*, collected in BATHUS 2, stn DW 730, is somewhat comparable to *D. tropicensis*, but not with a so slender outline and a so attenuated base. Its ground colour is horny and the inner lip is smooth below the upper denticle.

D. tropicensis is also very close to *D. alisae* Boyer, 2001 and to *D. virginiae* Boyer 2001, these three species living sympatrically in the stn 190 of SMIB 8. *D. tropicensis* differs from *D. alisae* principally by its larger shell and protoconch, by its less produced spire and by its discontinuous pattern of decoration which better remembers that one of *D. caledonicus*. These four species show like representants of a descendant lineage.

Etymology. Referring to the range of distribution of the species, approximatively situated under the tropic of Capricorn.

Dentimargo cingulatus sp.nov.

Figs 10-12

Type material. Holotype (9.4 x 5 mm), MNHN (Figs 10-11) : SMIB 8.

Paratypes : 12 ad (L = 9 to 12.2 mm) + 3 juv, MNHN (Fig. 12) : same stn.

Material examined. BIOCAL : stn DW 44, 22°47'S, 167°14'E, 440-450 m, 4 juv lv, 8 dd, 4 juv dd.

MUSORSTOM 4 : stn DW 222, 22°58'S, 167°33'E, 410-440 m, 4 dd. – stn DW 229, 22°51'S, 167°13'E, 445-460 m, 1 lv, 2 juv lv. – stn DW 230, 22°52'S, 167°12'E, 390-420 m, 2 lv, 3 juv lv.

SMIB 2 : stn DW 3, 22°56'S, 167°15'E, 412-428 m, 2 dd, 1 juv dd. – stn DW 6, 22°56'S, 167°16'E, 442-460 m, 1 dd. – stn DW 9, 22°54'S, 167°15'E, 475-500 m,

1 lv, 2 dd. – stn DW 17, 22°55'S, 167°15'E, 428-448 m, 1 lv.

SMIB 3 : stn CP 4, 24°54'S, 168°22'E, 530 m, 2 lv.

SMIB 8 : stns DW 197-199, 22°52'S-22°53'S, 168°12'E-168°13'E, 408-436 m, 2 lv (holotype Figs 10-11, 1 paratype Fig 12), 2 juv lv (paratypes), 11 dd (paratypes), 1 juv dd (paratype). – stn DW 201, 22°59'S, 168°21'E, 500-504 m, 1 dd.

BATHUS 2 : stn DW 719, 22°48'S, 167°16'E, 444-445 m, 4 dd.

Type locality. SMIB 8, stn DW 197-199, 22°52'S-22°53'S, 168°12'E-168°13'E, 408-436 m, off Ile des Pins, southeast of Grand Récif Sud, N.C., bathyal.

Description. Shell biconical somewhat oval, moderately slender; protoconch small, narrow and tall, paucispiral; spire regularly conical, non-stepped, representing around 30% of the total length; aperture moderately opened, labrum not arched, faintly oblique, one small denticle at the upper part of inner labrum, lower denticles very faint, external margin thick, shoulder of the labrum faintly stepped; parietal border moderately concave, 4 strong columellar plaits, the first two ones being oblique and subequal, the third almost horizontal, and the fourth nearly perpendicular to the parietal border; ground colour white, 2 well defined spiral orange lines on the body whorl recovering the labial margin, a third orange line above the lower suture, a fourth one suggested above the next suture.

Dry animals are orange coloured.

Distribution. South from N.C. to Northern Norfolk ridge (22°47'S to 24°54'S; 167°12'E to 168°22'E). Bathyal : lv in 420-530 m, dd in 428-500 m.

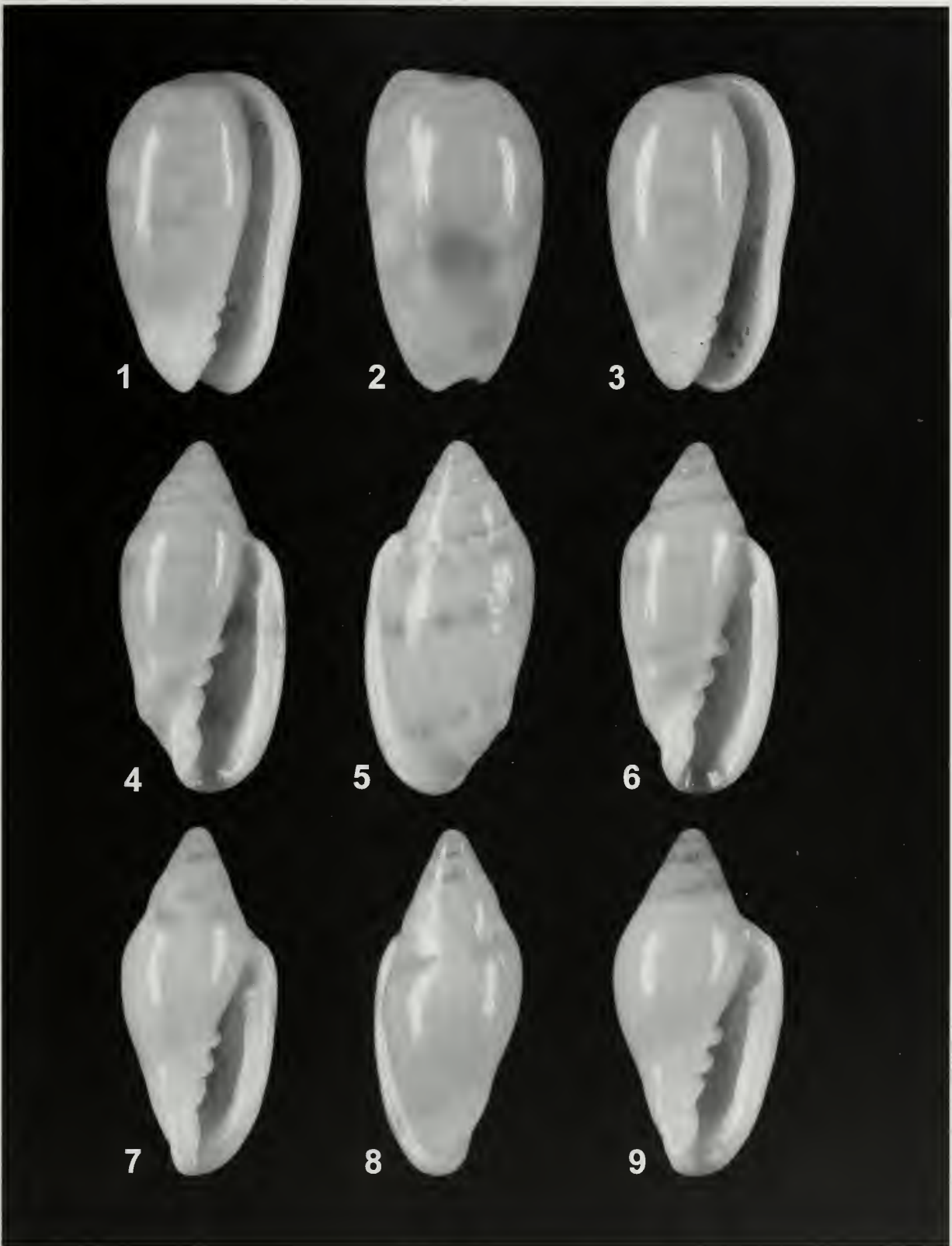
Remarks. The morphology of the shell is very constant all along its wide range of distribution. The size range is : L = 9 to 12.2 mm, W = 4.5 to 6 mm.

The spiral decoration may be very erased or lacking. A group of similar forms, possibly polyspecific, is represented in Northern N.C. It can be distinguished from *D. cingulatus* sp. nov. by the presence of much wider protoconchs and stronger stepped spires. *Dentimargo guionneti* Cossignani, 2001 belongs to this northern group.

Etymology. Referring to the spiral decoration of the shell.

Figures 1-9

1. *Gibberula nebulosa*, holotype, 6.8 x 4.15 mm.
2. *Gibberula nebulosa*, paratype, 6.15 x 3.65 mm.
3. *G. nebulosa*, paratype, 7.1 x 4 mm.
- 4-5. *Dentimargo caledonicus*, 15 x 7 mm, SMIB 8, stn DW 197-199.
6. *D. caledonicus* 16 x 7.25 mm, SMIB 8, stn 197-199.
- 7-8. *D. tropicensis*, holotype, 13 x 5.7 mm.
9. *D. tropicensis*, paratype, 11.45 x 5.6 mm.



Dentimargo biocal sp. nov.

Figs 13-15

Type material. Holotype (6.4 x 3.8 mm), MNHN (Figs 13-14) : BIOCAL, stn DW 44.

Paratypes : 72 ad (L = 6.2 to 8.8 mm) + 20 juv, 14 ad + 8 juv (ale), MNHN; 2 ad, AMS; 2 ad, NMNZ; 1 ad, NSMT; 1 ad, MMM. Same stn.

Material examined. "Vauban" 1978-79 : stn 2, 22°17'S, 167°14'E, 425-430 m, 1 lv, 1 juv lv, 14 dd, 2 juv dd. – stn 3, 22°17'S, 167°12'E, 390 m, 4 dd. – stn 4, 22°17'S, 167°13'E, 400 m, 1 dd.

BIOCAL : stn DW 44, 22°47'S, 167°14'E, 440-450 m, 17 lv (holotype Figs 13-14, 16 paratypes), 13 juv lv (paratypes), 79 dd (paratypes), 12 juv dd (paratypes). – stn DW 77, 22°15'S, 167°15'E, 440 m, 1 lv, 1 juv lv, 14 dd, 1 juv dd.

MUSORSTOM 4 : stn DW 212, 22°47'S, 167°10'E, 375-380 m, 1 dd. – stn DW 222, 22°58'S, 167°33'E, 410-440 m, 2 dd, 1 juv dd. – stn DW 230, 22° 52'S, 167°12'E, 390-420 m, 1 dd.

SMIB 8 : stns DW 197-199, 22°52'S-22°53'S, 168°12'E-168°13'E, 408-436 m, 1 lv, 6 dd.

BATHUS 2 : stn DW 719, 22°48'S, 167°16'E, 444-445 m, 19 dd, 1 juv dd. – stn DW 723, 22°50'S, 167°27'E, 430-433 m, 2 dd. – stn DW 724, 22°48'S, 167°26'E, 344-358 m, 1 dd. – stn DW 729 22°52'S, 167°12'E, 400 m, 1 dd.

As *D. cf. biocal* :

BATHUS 3 : stn DW 818, 23°44'S, 168°16'E, 394-401 m, 1 juv lv, 4 dd (Fig. 15).

Type locality. BIOCAL, stn DW 44, 22°47'S, 167°14'E, 440-450 m, Southern N.C., bathyal.

Description. Shell somewhat biconical-oval, squat; protoconch wide and low, paucispiral, spire short, rather obtuse and blunted, representing 22% of the total length, 2 thin spire whorls, the upper one being very short and somewhat indistinct; body whorl rounded and inflated; aperture moderately opened, labrum arched, faintly oblique; one very small denticle at the upper part of inner labrum, lower denticles faintly

distinct; external margin thick, shoulder of the labrum non-stepped; columellar border somewhat concave, bearing 4 plaits, the first two ones oblique and subequal, the third one almost horizontal and the fourth one nearly perpendicular to the parietal border; ground colour light greenish-yellow.

Figures 10-18

10-11. *Dentimargo cingulatus*, holotype, 9.4 x 5 mm. **12.** *D. cingulatus*, paratype, 9.35 x 5.05 mm. **13-14.** *D. biocal*, holotype, 6.4 x 3.8 mm. **15.** *D. cf. biocal*, 7.3 x 4.05 mm. **16.** *Protoginella cf. maestratii*, 7.25 x 4.5 mm, MUSORSTOM 4, stn DW 224. **17.** *P. maestratii*, holotype, 8.3 x 4.7 mm. **18.** *P. maestratii*, 7.6 x 4.9 mm, BATHUS 2, stn DW 729.

Wet animals are creamy beige (BIOCAL, stn DW 44), dry animals are orange (SMIB 8, DW 197-199).

Distribution. South from N.C. to Northern Norfolk ridge (22°15'S to 22°58'S, 167°10'E to 167°33'E). Bathyal : lv in 430-440 m, dd in 358- 444 m.

Remarks. Despite its variation in relative length of spire, the shell morphology of *D. biocal* is very constant along its range of distribution. The size range is : L = 6.2 to 8.8 mm, W = 3.6 to 5 mm. Depending on localities, the shells may show 2 orange marks on the backside of the margin, on a creamy-white ground.

The single lot collected on the northern slopes of the Norfolk ridge (BATHUS 3, stn DW 818) displays shells with a similar morphology, but with a smaller protoconch, a more produced spire, a shorter aperture, a more receding labial shoulder and a pronounced orange decoration (Fig. 15). The entire shell is light orange, with 2 thin orange bands on the body whorl, another one behind the lower suture, and a dark orange zone covering all the base of the shell. This lot, labelled as *D. cf. biocal*, may represent a sibling species restricted to a part of Northern Norfolk ridge.

D. biocal is not represented in MNHN collections from Northern N.C.

Etymology. Referring to the campaign BIOCAL which yielded the most important lot of specimens.

Genus *Protoginella* Laceron, 1957

Type species : *Marginella lavigata* Brazier, 1877, by original designation.

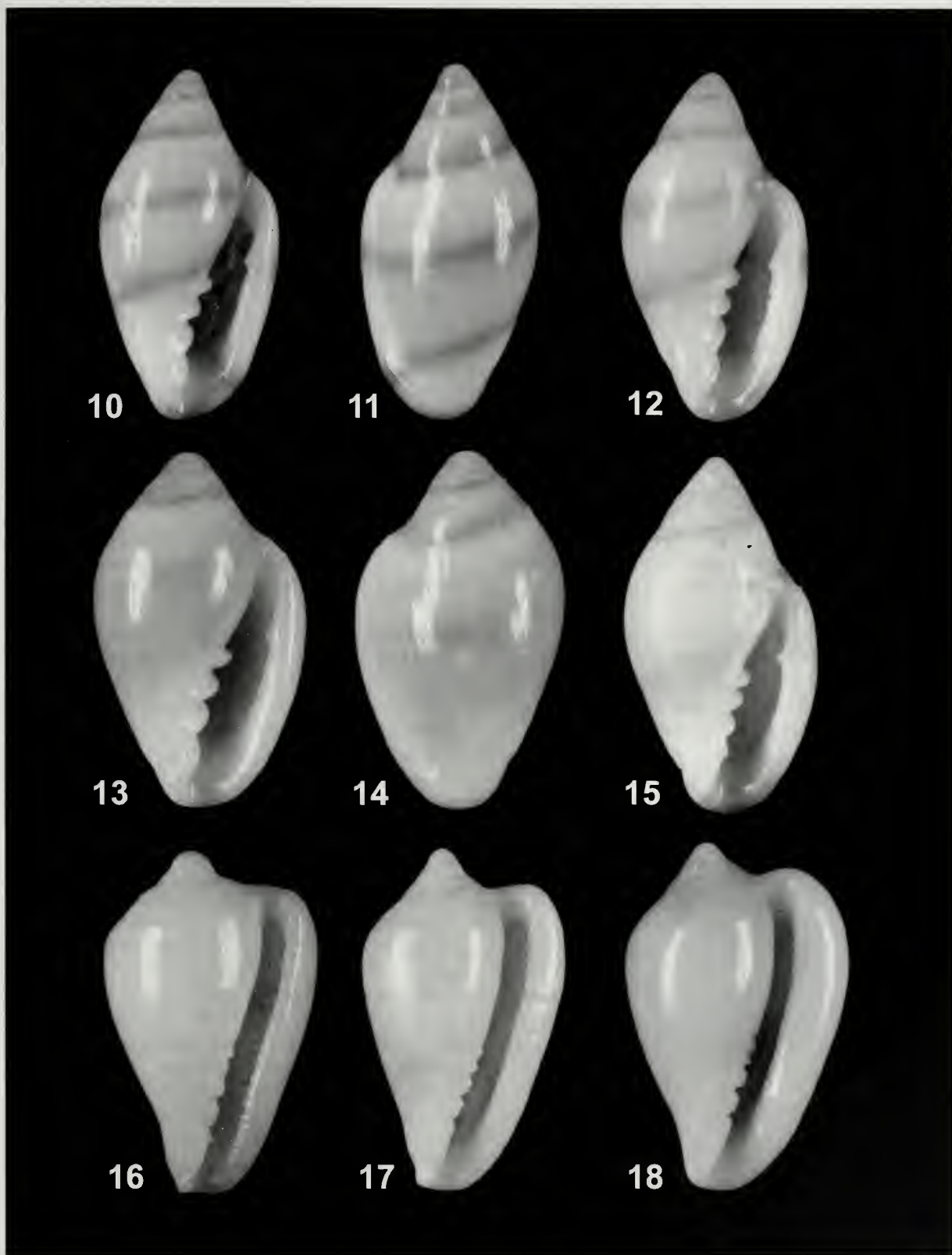
A phenon labelled as *P. cf. caledonica* in Boyer (2001) can be confirmed as constituting a new species widely distributed in Southern N.C. and Northern Norfolk ridge. This species is described hereunder.

***Protoginella maestratii* sp. nov**

Figs 16-20

Type material. Holotype (8.3 x 4.7 mm), MNHN (Fig. 17) : MUSORSTOM 4, stn DW 212.

Paratypes : 6 ad (L = 7.4 to 8.3 mm), 7 ad (ale), MNHN; 2 ad, AMS; 2 ad, NMNZ; 1 ad, NSMT; 1 ad, MMM. Same stn.



Material examined. "*Vauban*" 1978-79 : stn 15, 22°49'S, 167°12'E, 390-395 m, 2 dd. – stn 16, 22°46'S, 167°12'E, 390-400 m, 1 lv, 5 dd, 1 fr.

BIOCAL : stn DW 37, 23°00'S, 167°16'E, 350 m, 3 dd. – stn DW 38, 23°00'S, 167°15'E, 360 m, 1 juv lv, 1 dd. – stn DW 44, 22°47'S, 167°14'E, 440-450 m, 36 lv, 3 juv lv, 82 dd, 8 juv dd. – stn DW 46, 22°53'S, 167°17'E, 570-610 m, 2 lv, 1 juv lv, 142 dd, 46 juv dd. – stn DW 49, 23°03'S, 167°32'E, 825-830 m, 1 dd. – stn DW 53, 23°09'S, 167°43'E, 975-1005 m, 2 dd. – stn DW 77, 22°15'S, 167°15'E, 440 m, 5 lv, 2 dd.

MUSORSTOM 4 : stn DW 212, 22°47'S, 167°10'E, 375-380 m, 7 lv (paratypes), 13 dd (holotype Fig. 17, 12 paratypes). – stn DW 219, 23°02'S, 167°33'E, 750 m, 1 dd. – stn DW 220, 22°58'S, 167°38'E, 505-550 m, 1 dd. – stn DW 221, 22°59'S, 167°37'E, 535-560 m, 1 dd. – stn DW 222, 22°58'S, 167°33'E, 410-440 m, 7 lv, 4 dd. – stn DW 223, 22°57'S, 167°30'E, 545-560 m, 1 dd. – stn DW 224, 22°55'S, 167°27'E, 575-595 m, 3 dd (Fig. 16). – stn DW 230, 22°52'S, 167°12'E, 390-420 m, 1 dd.

SMIB 1: stn DW 2, 22°52'S, 167°13'E, 415 m, 2 lv (1 used for radula extraction), 1 dd.

SMIB 2 : stn DW 3, 22°56'S, 167°15'E, 412-428 m, 1 dd. – stn DW 5, 22°56'S, 167°14'E, 398-410 m, 2 dd. – stn DW 6, 22°56'S, 167°16'E, 442-460 m, 1 lv. – stn DW 9, 22°54'S, 167°15'E, 475-500 m, 1 dd. – stn DW 16, 22°51'S, 167°12'E, 390 m, 2 dd.

SMIB 3 : stn CP 4, 24°54'S, 168°22'E, 530 m, 1 lv, 2 dd.

BERYX 11: stn DW 27, 23°37'S, 167°41'E, 460-470 m, 2 lv.

SMIB 8 : stn DW 166, 23°38'S, 167°43'E, 433-450 m, 6 dd. – stn DW 167, 23°38'S, 167°43'E, 430-452 m, 3 dd. – stn DW 169, 23°37'S, 167°42'E, 447-450 m, 3 lv, 1 dd. – stns DW 182-184, 23°18'S-23°19'S, 168°05'E, 305-367 m, 1 juv lv, 5 dd. – stn DW 189, 23°18'S, 168°06'E, 400-402 m, 11 dd. – stn DW 190, 23°18'S, 168°05'E, 305-310 m, 1 dd. – stns DW 197-199, 22°52'S-22°53'S, 168°12'E-168°13'E, 408-436 m, 38 dd.

BATHUS 2 : stn DW 719, 22°48'S, 167°16'E, 444-445 m, 9 dd. – stn DW 720, 22°52'S, 167°16'E, 530-541 m, 1 lv, 36 dd, 1 juv dd. – stn DW 721, 22°54'S, 167°17'E, 525-547 m, 28 dd, 6 juv dd. – stn DW 723, 22°50'S, 167°27'E, 430-433 m, 3 lv, 6 dd. – stn DW 729, 22°52'S, 167°12'E, 400 m, 1 lv (Fig. 18), 2 juv lv, 1 dd.

BATHUS 3, stn DW 830, 23°20'S, 168°01'E, 361-365 m, 2 dd.

Type locality. MUSORSTOM 4, stn DW 212, 22°47'S, 167°10'E, 375-380 m, west-southwest off Ile des Pins, east of Grand Récif Sud, N.C., bathyal.

Description. Shell white, subpellucid, triangular, eratoiform, squat, very widening at the level of the shoulder and very attenuated towards the base; spire short, narrow and pointed, non turruculated;

protoconch narrow and produced, paucispiral; aperture, moderately widened, faintly but regularly curved, inner labrum thickened, somewhat enveloping, bearing around 25 very faint denticles, upper labrum sticking out backwards and producing above the anal canal, outer margin very thickened; parietal callus making an axial crest continuous and pronounced; 5 columellar plaits making faint crenulations in the parietal callus, the first plait is long and very oblique, the second and the third ones are thick and faintly biplicate and incised at the level of the parietal callus, without visible external varix, the fourth and fifth are smaller and simple, but well distinct.

Animal : based on 3 well-conserved dry specimens (BATHUS 2, stn DW 723), foot yellowish with violet marks, mantle light violet with small violet stains on the border, siphon light violet with a darker tip.

Radula : examined and pictured from one specimen (SMIB 1, stn DW 2, L = 6.8 mm). Type 5 modified (Figs 19-20), plates bearing 20 to 23 cusps, large and small alternating, with a large central cusp very produced, frontline of the cusps almost rectilinear.

Distribution. South from N.C. to Northern Norfolk ridge (22°46'S to 24°54'S, 167°12'E to 168°22'E). Bathyal : lv in 360-570 m, dd in 310-975 m.

Remarks. *P. maestratii* sp. nov. presents a very variable shell morphology, depending on the populations considered : the spire may be very narrow and produced in some populations, or squat and stepped in others; the labrum may be arched, highly produced and very thickened, without visible denticles, or more straight, angular and widening at the level of the shoulder and distinctly denticulated, or low streamlined, deeply enveloping the aperture in its medium part, with strong denticulations; the columellar plaits may be very faintly produced or sharply standing out, the fourth plait being always limited to a simple liration, whereas the fifth one is often strongly biplicated and sharply stepped. Very callous shells are frequent (Fig. 18).

Even if rarely occurring within such or such population, some sympatric specimens intergrading these forms are however observed.

The size range of the shell is : L = 5.05 to 10 mm, W = 3.3 to 6.05 mm. The size of the shells tends to be larger near from N.C. mainland and to become smaller southward (the 2 very large shells from the deep station DW 53-BIOCAL constituting an exception), reaching its minimal on Banc Stylaster, situated west from the Norfolk ridge (SMIB 8, stns 166, 167 & 169). On the eastern side of the Norfolk ridge (Banc Aztèque : SMIB 8, stns DW 182-184, 189, 190), *P. maestratii* presents larger specimens.

P. maestratii differs from *P. laseroni* Boyer, 2001, principally by its more produced and sharper spire, its more elevated labial shoulder, its smaller and

more numerous labial denticles, and the presence of 5 columellar plaits instead of 4.

P. maestratii differs from *P. caledonica* Boyer, 2001, principally by its more heart-shaped outline and its smaller and sharper protoconch, its less slender base, its enveloping and more elevated labrum, and its slightly more widened aperture. *P. maestratii* is generally squatter and more callous.

Although *P. maestratii* and *P. caledonica* must be considered as sibling species and despite the important material at hand, very few shells can be considered as intergrading. These few shells come from BIOCAL, stn DW 49 and MUSORSTOM 4, stns 220, 223 & 224 (Fig. 16).

The smallest specimens of *P. maestratii* have the same size than the specimens of *P. laseroni*, and the largest ones have the same size than many *P. caledonica*, both being sympatric with *P. maestratii* in very few stations :

P. maestratii was found with *P. laseroni* in SMIB 8, stns DW 182-184 & 190;

P. maestratii was found with *P. caledonica* in MUSORSTOM 4, stns DW 219, 220 & 221, each time as single shells (the one from stn DW 220 is considered as intergrading).

The scarce sympatry of *P. maestratii* with *P. laseroni* is due to the fact that *P. laseroni* is apparently endemic from one seamount from the Norfolk ridge, where *P. maestratii* might be at the upper and/or southern limit of its range of distribution.

The scarce sympatry of *P. maestratii* with *P. caledonica* is more surprising, as both species present more or less the same ranges of geographic and bathymetric distribution from Southern N.C. to the northern slopes of the Norfolk ridge. This kind of pattern is generally representative of a polymorphic species ranging along a bathymetric and/or a geographic cline. However, a better look on the compared bathymetry of both phenae shows that 70% of the stations where *P. maestratii* was sampled are situated in 350-500 m, whereas 70% of the stations where *P. caledonica* was sampled are situated in 500-700 m. Despite these different bathymetric preferences, the scarcity of sympatric occurrences must have a complementary explanation. The compared geographic distribution of both phenae does not reveal any coherent pattern. The dominant light and slender form of *P. caledonica*, with narrow aperture and large bulbous protoconch, is found all along the bathyal plains situated south from N.C., as is found the dominant callous and heart-shaped form of *P. maestratii* with more widened aperture and small protoconch.

As the cases of close similarities between both phenae are very limited and as the differences between both phenae are not based on a bathymetric or a geographic ground, the possibility of a cline of forms linking two phenae belonging to a single species cannot be accepted. The simplest explanation is that *P. maestratii* and *P. caledonica* are sibling

species which have any kind of different requirement which leads them to occupy different places.

Even if reaching also the north of the Norfolk ridge, *P. caledonica* does not settle the upper levels of the banks, as *P. maestratii* does on Banc Aztèque (310-400 m) and on Banc Stylaster (450-460 m).

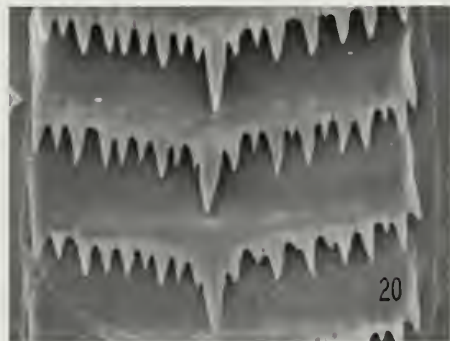
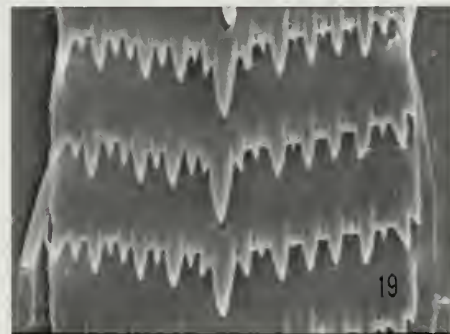
Like *P. laseroni* and *P. caledonica*, *P. maestratii* is not represented in the MNHN collections from Northern N.C., where the diversity of *Protoginella* species seems to be less important.

The chromatism of the animal of *P. maestratii* seems to be very close to that one of *P. laseroni*.

The radula of *P. maestratii* (Figs 19-20) differs strongly from that one of *P. laseroni* (BOYER 2001 : 168) as the later presents the classic corner-patterned plate with reduced number of cusps found in the group *Mesoginella* (sensu COOVERT & COOVERT, 1995), whereas the former shows a pattern of plates much closer to that one of some species belonging to the complex *Volvarina-Serrata* (comblike pattern).

So, the study of the radulae of all the species of *Protoginella* might be of interest for the understanding of the possible relationship between the group *Mesoginella* and the complex *Volvarina-Serrata*.

Etymology. The species is dedicated to Philippe Maestratii (MNHN), who valuably contributed to the building up of the New Caledonian collections of molluscs, and who sorted out most of the shells with such a patience and such a discriminating eye.



19-20 : radula from *Protoginella maestratii* (x 835), SMIB 1, stn DW 2.

DISCUSSION

On the ground of the observations reported in the present article and of the data from the previous one (BOYER, 2001), we can distinguish the outlines of an original pattern of distribution in the bathyal marginellid gastropods from N.C.

Each of the 16 species presented by us from Southern N.C. appears as lacking in Northern N.C., and it seems that none of the phenae examined from the northern stations is also found in the southern area, except the large *Volvarina armonica* Cossignani, 1997 which is apparently distributed all around the New Caledonia mainland at circalittoral and upper bathyal levels. So, a steep separation seems to occur at the specific level between the northern and the southern bathyal fauna from N.C., at least for small neogastropods having a direct (non-planktotrophic) development such as marginellids. The choppy relieves laying off the west and east coasts of N.C. at bathyal levels are apparently the place for special microenvironments favourable to the development of local endemisms and working like barriers preventing the diffusion of northern and southern populations. This situation remains to be fully documented and interpreted.

Superposed to this general pattern, a normal tendency to endemism seems to occur on the seamounts ranging upon the Northern Norfolk ridge. Depending on the species, the distribution of the seamounts marginellids seems however to be irregular and may be the result of very complex influences. The evolution history of this kind of endemism may be the matter of another process than the one working about the specific separation between northern and southern new-caledonian faunas.

The development of the study of MNHN marginellids collections may allow to interpret also the respective influences in the formation of the biodiversity observed at bathyal levels between New Caledonia and surrounding archipelagos.

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